Appendix P

Visual Resources Terms, Analysis Methods, and Rating System

Introduction

This appendix provides background information on visual resources terminology and concepts, analysis methods, and the ratings and evaluations of rendered key observation points (RKOPs).

Visual Resources Terms

Visual resources analyses involve analyzing a study area that comprises *viewsheds, o*r what people can see in the landscape, which encompass the entire area in which views would be affected by a proposed rail line. The study area and its viewsheds are defined by the physical constraints of the environment and the physiological limits of human sight. *Physical constraint*s of the environment include landform, land cover, and atmospheric conditions. Landform is a major factor in determining the study area because it can limit views or provide an elevated perspective for viewers. Similarly, land cover such as trees and buildings can limit views, while low-growing vegetation and the absence of structures can allow for unobscured views. Atmospheric conditions such as smoke, dust, fog, or precipitation can temporarily reduce visibility or be a more regular component of the visual landscape.

The *physiological limits* of human sight are affected by location, proximity, and light. Location refers to the topographic position of the viewer, such as being level with, above, or below what is being observed. Proximity is categorized into three distance zones: foreground (up to 0.5 mile from the viewer), middleground (0.5 mile to 3 miles from the viewer), and background (beyond 3 miles). A feature in the landscape is more dominant and has a greater importance the closer the feature is to the viewer, whereas importance is reduced the farther away the feature is. In the background, the scale and color of existing landscape elements and project features blend so that only broad forms, large-scale patterns, and muted colors are evident. Light also plays a large role in affecting views. For example, during the daytime, views are more readily available than at night, when darkness conceals details and color in the landscape in the absence of bright moonlight or artificial light sources. Furthermore, light level and direction change throughout the day, affecting color and individual forms. The environment's physical constraints and limits of human sight combine to establish viewsheds that range from restrictive to expansive, and study areas that range from smaller and more confined to larger and wider-reaching (FHWA 2015; Litton 1968).

The visual resources analysis also considers impacts on scenic vistas and scenic byways. *Scenic vistas* generally encompass a wide area with long-range views to surrounding elements in the landscape. Such vistas are often available to viewers due to open, flat agricultural lands with few obstructions and from elevated vantages with views over the landscape. In addition, vistas have a directional range. That is to say, some areas have scenic vistas with a 360° view in all directions, while others may be limited in one direction in a manner that reduces the line-of-sight angle and amount of vista that is visible, resulting in a narrower vista view. *Scenic byways* are designations awarded to roads across the country that exhibit one or more of six core intrinsic qualities—scenic, natural, historic, recreational, archaeological, or cultural—that contribute toward a unique travel experience. There are four scenic byways in the study area for the proposed rail line: Dinosaur Diamond Prehistoric Highway, Indian Canyon Scenic Byway, Nine Mile Canyon Scenic Backway, and Reservation Ridge Scenic Backway, as shown in Section 3.12, *Visual Resources*, Figure 3.12-1, of the EIS.

Key Observation Points

To identify the potential impacts of each Action Alternative on the visual environment, OEA selected key observation points (KOPs) where landscape features could be visually affected. These KOPs were determined to be most representative of the various existing visual landscapes located within and characteristic of the study area that could be affected by the Action Alternatives. These KOPs were selected to help readers generalize and understand the existing viewscape of the study area where the Action Alternatives could change views available to sensitive receptors and seen from sensitive viewing areas. OEA's process for identifying and refining the list of KOPs for analysis follows:

- OEA used Google Earth, Google Maps, Google Street View, U.S. Geological Survey Topographic Maps, and the Forest Service Interactive Travel Map to gain a broad-scale understanding of affected lands and land uses and associated federal and state recreational resources, in addition to any protected federal and state scenic resources (e.g., scenic byways, trails).
- To prepare for fieldwork, OEA conducted a preliminary geographic information system (GIS)-based viewshed analysis to identify areas of the Action Alternatives that can be seen from sensitive viewing points, such as recreation areas and travel corridors.
- Prior to conducting fieldwork, OEA requested comments on the fieldwork methods, including the proposed list of sensitive visual features to be surveyed, from cooperating agencies, including the Forest Service's Ashley National Forest and the Bureau of Land Management's (BLM) Utah State Office, Vernal Field Office, and Price Field Office. OEA did not receive comments from those agencies prior to fieldwork; therefore, OEA did not further refine the GIS-based viewshed analysis in response to agency comments.
- To identify the potential impacts of each Action Alternative on the visual environment, OEA selected 157 potential KOPs where landscape features could be visually affected. OEA evaluated these KOPs to determine if they were representative of the various existing visual landscapes located within and characteristic of the study area that could be affected by the proposed rail line. OEA reduced these 157 potential KOPs to 21 candidate KOPs to help readers generalize and understand the existing viewscape of the study area where the Action Alternatives could change views available to sensitive receptors and seen from sensitive viewing areas.
- OEA established the 21 candidate KOPs using the viewshed analysis and sensitive viewing points that would have views of the Action Alternatives. OEA took photographs in the field that documented prominent visual features (i.e., landforms, vegetation, rivers) associated with each candidate KOP and that may be affected by the Action Alternative, and recorded global positioning system (GPS) coordinates of the photos. OEA then evaluated candidate KOPs against available design plans, factoring agency concerns and sensitive visual receptors, to determine which of the candidate KOPs OEA should select for rendering.

OEA conducted fieldwork from October 1–3, 2019 to assess the existing visual character of the study area and to photograph the 21 candidate KOPs for the visual simulations (provided as Attachment I to this appendix). OEA conducted the fieldwork by visiting popular travel corridors and recreation areas from which outstanding visual resources can be seen. OEA conducted the fieldwork from public vantage points only.

Rendered Key Observation Points

Selection of Rendered Key Observation Points

OEA selected 15 locations to present before and after conceptual renderings of the proposed rail line from each RKOP. OEA chose these locations to obtain a representative cross-section of the various visual conditions that currently exist in the study area and in what manner they could be affected by the proposed rail line. OEA chose the locations in a manner to objectively represent all of the Action Alternatives while illustrating how various viewer groups would be affected by the proposed rail line.

OEA used the following process to select the RKOP locations.

- OEA evaluated public scoping comments from the Forest Service and BLM to determine the presence or absence of sensitive visual resources. There were no public scoping comments pertaining to visual resources from the Ute Indian Tribe.
- OEA conducted further coordination with the Forest Service, BLM, and Ute Indian Tribe to determine and prioritize sensitive visual resources that could be affected by the Action Alternatives. The Ashley National Forest, BLM, and Ute Indian Tribe did not provide comments in response to the requests for information and did not identify additional sensitive visual resources to be surveyed.
- Each Action Alternative has a minimum of six renderings to represent visual effects resulting from that particular alternative, to ensure that OEA captured visual conditions and potential impacts resulting from each Action Alternative.
- OEA selected locations along the Action Alternatives to capture vantages from Tribal Trust Lands, Ashley National Forest, the Dinosaur Diamond Prehistoric Highway (a National Scenic Byway), Utah's Indian Canyon Scenic Byway and Nine Mile Canyon Scenic Backway, and vantages from public viewing locations. Public viewing locations are from public roadways.
- OEA also chose locations that would represent both foreground and middleground views of the proposed rail line. OEA did not select any background views because the conceptual renderings would not show perceptible details at such distances.
- OEA selected the Tribal Trust Land and public rendering locations so that each rendering reflected a combination of the following three elements:
    - Variation in landforms to account for the natural deviation that occurs throughout the study area and to represent the various landforms that could be affected by the proposed rail line. For example, locations that would show how the proposed rail line would affect both flat lands and areas of topographical relief were more desirable than showing only flat lands. This allows for the conceptual rendering to be used to illustrate impacts on both landform types, instead of impacts on only one landform type and, subsequently, vegetation occurring on those landforms.
    - Views that may be considered and that are more open and show a larger portion of the proposed rail line represent "worst-case" scenarios that would be seen by affected viewer groups.

- The range of visual impacts that could result from the proposed rail line, including locations to show how cut and fill, roadway realignments, rail crossings over roadways, and building removal would change the existing visual environment.

- OEA chose locations without referencing land ownership data to ensure OEA selected all locations without preference toward any particular landowner.

The rendering locations and rendered features represent visual effects across the Action Alternatives, illustrate a representative sample of potential visual changes, and serve to help readers assess how visual effects would translate to other site-specific locations that were not rendered. Table P-1 provides additional information on why OEA selected a particular location to be an RKOP.

Table P-1. Rendering Location Selection Reasoning

Location	Action Alternative(s)	Selection Reasoning
RKOP 27	Wells Draw	This depicts the view from an interpretive overlook located just east of Nine Mile Canyon Scenic Backway. This rendering provides an elevated vantage point that shows how middleground views from the interpretive overlook and Nine Mile Canyon Scenic Backway would be altered.
RKOP 33	Wells Draw	This depicts the view from Nine Mile Canyon Scenic Backway. This rendering provides a vantage point that shows how foreground views from Nine Mile Canyon Scenic Backway would be altered. It also shows where a bridge would be built and areas of cut and fill that occur as the proposed rail line would traverse the top of the ridgeline.
RKOP 37	Wells Draw	This depicts views from Nine Mile Canyon Scenic Backway, which is well traveled, and illustrates how foreground views of the proposed rail line crossing the roadway would likely appear. This view encompasses a wide viewshed, which occurs elsewhere in the study area. It also shows where a grade-separated crossing would be built to cross the road and areas of mostly cut that would occur as the proposed rail line traversed the landscape.
RKOP 44	Wells Draw	This depicts the view from an overlook area located just east of Nine Mile Canyon Scenic Backway. This rendering provides an elevated vantage point that shows how the foreground of this scenic vista view would be altered. It also illustrates the proposed rail line crossing flatter land. It also shows areas of cut and fill that would occur as the proposed rail line traversed the landscape.
RKOP 73	Wells Draw	This depicts extensive cut and fill, and associated vegetation removal from where the proposed rail line would run parallel to Argyle Canyon Road. Residents would need to be relocated to accommodate the proposed rail line.
RKOP 83	Indian Canyon Whitmore Park	This depicts the view from Road 11160 South, off of Dinosaur Diamond Prehistoric Highway/Indian Canyon Scenic Byway (US 191). This rendering shows how foreground views toward Tribal Trust Land would be altered. It also illustrates the proposed rail line crossing the base of hillsides and shows areas of cut and fill that would occur as the proposed rail line traversed the landscape.
RKOP 90	Indian Canyon Whitmore Park	This depicts the view from US 191 within Ashley National Forest. This rendering provides a roadside vantage point that shows how the foreground of this scenic view would be altered by the proposed rail line traveling along the base of the hills. It also illustrates how the proposed rail line would cut through the base of a hill and a bridge crossing over a drainage.

Location	Action Alternative(s)	Selection Reasoning
RKOP 110A	Indian Canyon Wells Draw	This depicts a view from the intersection of Emma Park Road with US 6, at the terminus for the proposed rail line for the Indian Canyon Alternative and Wells Draw Alternative. This illustrates how the proposed rail line would connect to the existing rail line, a bridge across the existing rail line, and areas of cut and fill. Two renderings are needed from this location to show the Action Alternatives because the Whitmore Park Alternative would cross the existing rail line approximately 625 feet southeast of the crossing for the Indian Canyon Alternative and Wells Draw Alternative, and the alignments differ slightly.
RKOP 110B	Whitmore Park	This depicts a view from the intersection of Emma Park Road with US 6, at the terminus for the proposed rail line for the Whitmore Park Alternative. This illustrates how the proposed rail line would connect to the existing rail line, a bridge across the existing rail line, and areas of cut and fill. Two renderings are needed from this location to show the Action Alternatives, because the Whitmore Park Alternative would cross the existing rail line approximately 625 feet southeast of the crossing for the Indian Canyon Alternative and Wells Draw Alternative, and the alignments differ slightly.
RKOP 120	Whitmore Park	This depicts the view from an area with scattered rangelands, located off of US 191. This rendering shows how the foreground of this scenic vista view would be altered by the proposed rail line crossing the roadway and switching back and forth up the hillsides.
RKOP 125	Indian Canyon, Wells Draw	This depicts the view from US 191. This rendering provides a roadside vantage point from within Ashley National Forest that shows how the foreground of this view would be altered by the proposed rail line switching back and forth across the hillside. It also shows an at-grade road crossing and road realignment.
RKOP 126	Indian Canyon, Whitmore Park	This depicts the view from US 191. This provides a roadside vantage point from within the Ashley National Forest that shows how the foreground of this view would be altered by the proposed rail line tunneling through and exiting from/entering the hill. It also shows an at-grade road crossing and road realignment.
RKOP 139	Indian Canyon, Whitmore Park	This depicts the view from US 191. This rendering provides a roadside vantage point that shows how the foreground of this scenic view would be altered by the proposed rail line traveling along the base of the hills. It also illustrates how the proposed rail line would affect this rural residence/ranch and shows areas of cut and fill that would occur as the proposed rail line traversed the landscape.
RKOP 146	Indian Canyon	This depicts the view from a residential area located off of US 40. This rendering shows how the foreground views would be altered for residents in the area south of Coulton Road. It also illustrates the proposed rail line crossing flatter land between the two areas of development.
RKOP 156	Whitmore Park	This depicts the view from a residential area located off of US 40. This rendering provides an elevated vantage point that shows how the foreground of this scenic vista view would be altered for residents in the area. The rendering also illustrates the proposed rail line crossing flatter land.

Assumptions

After selecting the RKOP locations, OEA developed renderings through an objective analytical and computer modeling process. The renderings are accurate within the constraints of the available site and alternative data. OEA overlaid plan views of the alignment centerlines with station markings on

a digital terrain model in Google Earth; added elevation markers or simple shape models to identify rail elevations indicated in alignment profile drawings; and superimposed screenshots from RKOP positions in Google Earth onto photographs in Photoshop to guide the positioning of project features in the conceptual renderings. OEA then used design data—including engineering drawings, elevations and cross sections, site and topographical contour plans, concept figures, and reference pictures—as a basis for preparing conceptual renderings.

In developing the conceptual renderings, OEA used the following assumptions.

- Limits of cut and fill would be approximate as shown for cut-and-fill footprints in the GIS files.
- All existing vegetation would be removed throughout the cut-and-fill areas. The color and brightness of the ground in cut-and-fill areas would be similar to that found in other existing road cuts or naturally eroding slopes near each location. Cut-and-fill areas are rendered in the simulations as sparsely vegetated, with limited cover of grasses and widely scattered small shrubs (the likely state of most cut and fill slopes several years after construction).
- Paved public roadway crossings, if not grade-separated, would be equipped with active warning devices (bells, flashers, and gates). Gravel and unsurfaced public roadway crossings and all private roadway crossings, if not grade-separated, would be equipped with passive warning devices (stop signs and crossbucks).
- Communications towers, where visible, would be of a be a triangular lattice tower design, approximately 120 feet tall.

The before and after conceptual renderings provide clear images of the location, scale, and visual appearance of alternative features based on design information available at the time of rendering. Although the project elements will continue to undergo design refinement through final design stages, and site-specific design changes would affect visual resources and those specific sites, these refinements are not expected to result in substantial differences in individual features that would affect the outcome of the visual resources analysis and findings presented in this EIS.

Evaluation Ratings

Evaluation ratings help determine the level of impact for expected changes to the existing visual character and quality. OEA developed a rating system independently of, but using the methods and protocol contained in, the Federal Highway Administration (FHWA) *Guidelines for the Visual Impact Assessment of Highway Projects* (FHWA 2015). OEA used this rating system to evaluate non-BLM-administered lands. Once the conceptual renderings were created, OEA performed the visual impact assessment rating process, which determines the existing and proposed visual character and quality of the study area. For BLM-administered lands, OEA assessed scenic quality using BLM Visual Resource Management (VRM) guidance.

The visual resources analysis uses a descriptive means for rating and assessing impacts that is based on a numeric rating system. Numeric values are initially assigned to these descriptors that then determine the descriptive ratings. The numeric values range from 1 to 7 and correlate to descriptive ratings that range from Very Low to Very High. Subsequent sections in this appendix describe the numeric values and associated descriptive ratings in more detail.

Visual Resource Ratings—Non-BLM-Administered Lands

For the rendering analysis on non-BLM-administered lands, including National Forest and other public lands and scenic byways, three OEA reviewers evaluated the visual quality using the *Natural Harmony, Cultural Order, and Project Corridor Coherence Ratings* (Figure P-1 and Table P-2). OEA also evaluated daytime and nighttime light and glare ratings using the *Daytime and Nighttime Light and Glare Level Ratings* (Figure P-3, Table P-3, and Table P-4). The OEA reviewers rated numerically visual quality and daytime and nighttime light and glare on a comparative basis with similar features within the viewshed, and then tabulated a total score (Table P-6 through Table P-8, Table P-10 through Table P-13). The OEA reviewers averaged their scores to determine the score used in the analysis (Table P-5 and Table P-9).

Natural Harmony, Cultural Order, and Project Corridor Coherence Ratings

Aesthetic and visual resources are the visible components of the natural, cultural, and project corridor environments in the study area. Aesthetic and visual resources are assessed by evaluating the visual character and visual quality of the resources that comprise the project corridor environment before and after construction of a proposed rail line and how these changes affect the surrounding natural and cultural environments.

- *Visual character* includes attributes such as form, line, color, and texture and is used to describe, not evaluate, the visual environment; that is, these attributes are neither considered good nor bad.
- *Visual quality* is used to describe what viewers like and dislike about the visual resources that compose a particular scene and are expressed in terms of *natural harmony*, *cultural order*, and *project corridor coherence*.

Natural harmony, cultural order, and project corridor coherence are independent elements that contribute to the overall visual quality. The overall visual quality is evaluated to determine if the composition meets or does not meet visual preferences and expectations. As previously described, to determine the overall visual quality, natural harmony, cultural order, and project corridor coherence are first assigned a numeric value that translates to a descriptive rating as shown in Figure P-1.

Figure P-1. Natural Harmony, Cultural Order, and Project Corridor Coherence Ratings

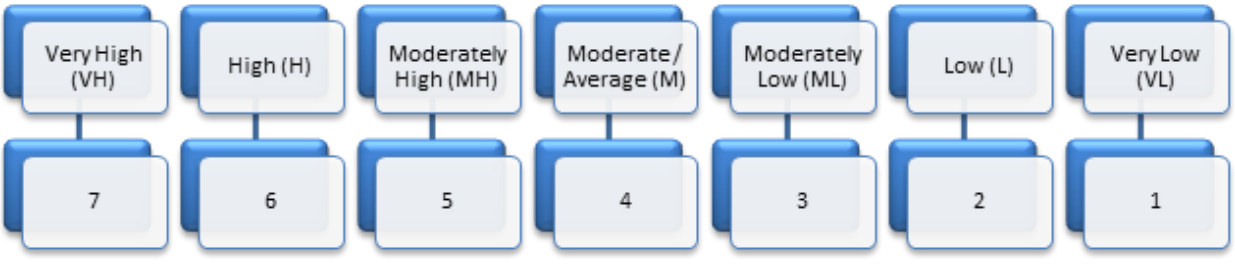


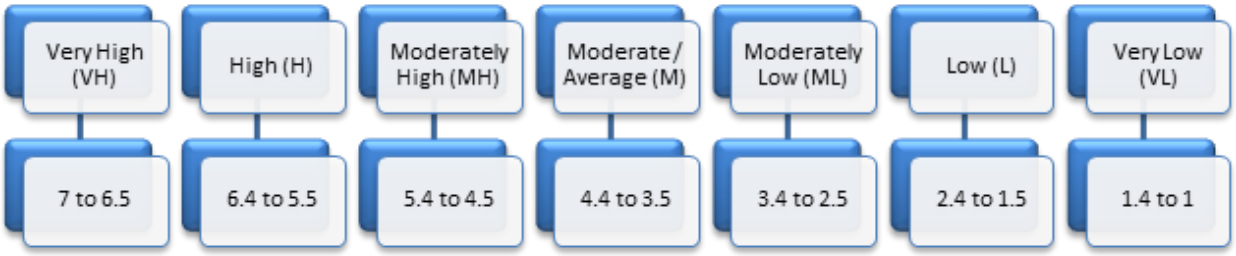
Table P-2 provides guidance on how to rate the natural harmony, cultural order, and project corridor coherence. The overall visual quality is then calculated for existing and proposed

conditions by averaging the natural harmony, cultural order, and project corridor coherence ratings as follows.

$$\text{Visual Quality} = \frac{\text{Natural Harmony Rating + Cultural Order Rating + Project Corridor Coherence Rating}}{3}$$

The overall visual quality is then assigned a descriptive rating, called a *Visual Quality Rating*, based on the numeric values as shown in Figure P-2.

Figure P-2. Visual Quality Ratings



A Very High rating corresponds to more pristine natural evironments that are untouched by humans or cultural and project corridor environments that are extremly well designed. As such, higher visual ratings represent landscape compositions that are vivid and that may evoke feelings of awe and wonderment. A Very Low rating corresponds to highly disjunct landscapes that have been haphazardly altered by humans. As such, lower visual quality ratings correspond to landscape compositions that may evoke negative emotional responses in viewers. In general, the more a composition meets visual preferences and expectations, the more positive the viewer response. In general, the more positive the viewer response is, the more memorable, or vivid, the composition becomes. For example, a more positive viewer response occurs when a development is not perceived as an intrusion, but is seen as an integrated element belonging to a harmonious and orderly landscape. Conversely, a negative viewer response would occur when a development is perceived as an intrusion, creating a disjunct or discordant addition to the landscape.

Table P-2. Natural Harmony, Cultural Order, and Project Corridor Coherence Ratings Guidance

Visual Resource	Rating Factors for Determining Visual Quality						
	Very High (7)	**High (6)**	**Moderately High (5)**	**Moderate (4)**	**Moderately Low (3)**	**Low (2)**	**Very Low (1)**
Natural Harmony	Landscape is pristine and untouched by human influences. Natural state is exemplary at a global level. Natural state may be very harmonious but may also be visually distinct in that the natural landscape inspires awe.	Landscape is largely untouched by natural and human influences. Natural state is exemplary to region and vicinity. Perceived as very harmonious.	Landscape has few visible modifications but they do not greatly detract from available views. Natural state is of higher quality than natural environments that are more common to region and vicinity. Perceived as harmonious.	Natural landscape has visible natural and human modifications. Natural state is common to region and vicinity. Perceived as fairly harmonious with some slight distractions.	Landscape has notable visible modifications that detract from available views. Natural state is of lesser quality than natural environments that are more common to region and vicinity. Perceived as disharmonious.	Very disrupted natural landscape. Natural state may be perceived as an eyesore. Perceived as very discordant.	Natural landscape is in disarray and severely degraded.
Cultural Order	Cultural landscape is exceptional and can be perceived as having exceptional design cohesion recognized at a global level. Land uses may blend seamlessly but may also be visually distinct in that the cultural landscape inspires awe.	Cultural landscape is exemplary and can be perceived as having exemplary design cohesion compared to region and vicinity. Land uses blend seamlessly. Perceived as very orderly.	Cultural landscape is typical of the region and vicinity. Land uses blend well. Can be perceived as having superior design cohesion to ordinary or familiar cultural environment.	Cultural landscape contains orderly and familiar design elements typical of the region and vicinity. Land uses may be slightly disjointed. Can be perceived as an ordinary or familiar cultural environment.	Cultural landscape contains some unifying elements but generally lacks design cohesion. Perceived as containing highly disjointed land uses.	Cultural landscape lacks design cohesion and sense of place. May be perceived as blight.	Cultural landscape is in disarray and severely degraded.
Project Corridor Coherence	Project corridor blends with natural and cultural landscape to the degree that it cannot be noticed or can be perceived as providing an exceptional contribution to surrounding visual environments.	Project corridor is a part of the natural and cultural landscape and can be perceived as a beneficial, contributing visual element to surrounding environments.	Project corridor responds well to the natural and cultural landscape and can be perceived as being very compatible with surrounding environments.	Project corridor responds to the natural and cultural landscape in an adequate manner. Would require minor to moderate improvements for better compatibility with surrounding environments. Perceived as being common to the setting with some slight distractions.	Project corridor does not respond to the natural or cultural landscape and can be perceived as disjunctive. Would require moderate to substantial redesign to rectify compatibility with surrounding environments. Perceived as incoherent.	Project corridor substantially degrades the natural or cultural landscape. Would require substantial to major redesign or relocation to rectify compatibility with surrounding environments. Perceived as very incoherent.	Project corridor is in disarray and severely degrades the natural or cultural landscape. Would require major redesign or relocation to rectify compatibility with surrounding environments.
Visual Quality[a]	Used when Existing Project Corridor is Developed and for Proposed Project Conditions: $\frac{\text{Natural Harmony Rating + Cultural Order Rating + Project Corridor Coherence Rating}}{3}$			OR	Used when Existing Project Corridor is Not Developed: $\frac{\text{Natural Harmony Rating + Cultural Order Rating}}{2}$		

Notes:

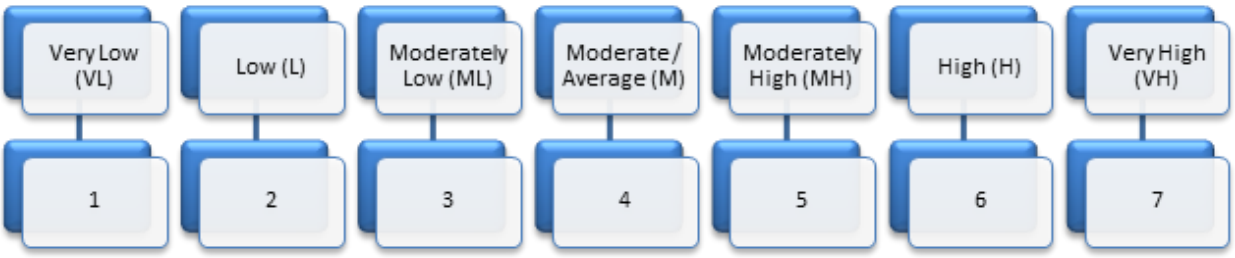
[a] The combined evaluation of visual quality and memorability of natural harmony, cultural order, and project coherence. Translate the numeric calculation to the descriptive rating.

Light and Glare Ratings

Light is a function of natural and artificial illumination that is present during the day and night within the natural, cultural, and project corridor environments. Sources of natural light include the sun, moon, stars, fire, and lightening, and sources of artificial light can include streetlights, vehicle headlights, landscape lighting, external security lighting, internal building lighting, and stadium/playing field lighting. Levels of light are influenced by the time of day, atmospheric conditions, the presence or absence of both natural and artificial lighting, and natural and built features that may filter or screen light. The visual landscape can range from being very brightly lit to being very dimly lit to being dark and not lit at all. In addition, lighting is influenced by the color temperature of the light source that can give the appearance of warmer, more orangey lighting or brighter, more blueish or whitish lighting. The height and angle of lighting and presence or absence of shielding affects whether or not lighting spills beyond a specific boundary, creating light trespass, or radiates upward into the night sky, creating ambient light glow, which brightens the night sky.

Within the study area, light and glare levels are assessed by evaluating existing and resultant light and glare levels associated with a project site and the surrounding project vicinity. This helps to determine the changes in light and glare levels, specifically, at a project site. This also helps to determine if, for example, vegetation removal or light fixture installation at a project site would result in an increase in light and glare levels on adjacent properties in the project vicinity. Or, perhaps, if built structures or landscaping would introduce shade or filter project lighting and result in a decrease in light and glare levels on adjacent properties in the project vicinity. Rating light and glare levels in this manner helps to frame the impact discussion and aids in determining how the overall light and glare levels are changed within the study area and the source and location of such changes. The levels of daytime and nighttime light and glare are rated as shown in Figure P-3.

Figure P-3. Daytime and Nighttime Light and Glare Level Ratings



Again, while the visual resource rating is a measurement of *quality*, the light and glare ratings are a measurement of *intensity* to assess degree of change and are not intended to imply judgment of good versus bad.

Table P-3 provides a general guide to assessing and rating *daytime* light and glare levels. Table P-4 provides a general guide to assessing and rating *nighttime* light and glare levels. As shown in these tables, study area light and glare levels are evaluated using the same parameters. Table P-4 focuses primarily on artificial lighting levels.

Table P-3. Daytime Light and Glare Levels

Location	Very Low (1)	Low (2)	Moderately Low (3)	Moderate (4)	Moderately High (5)	High (6)	Very High (7)
Project Vicinity and Project Site[a]	**Natural Environment:** Very densely vegetated and/or heavy shading or shadowing that may result from vegetation, landforms, or natural materials that create an enclosed effect. May be typically overcast, dull, or rainy weather conditions. May be perceived as dark and muted. Details may be hard to see due to heavy shade and shadowing combined with low lighting levels and darker colored natural features. Smaller sized water bodies may be present. **Cultural Environment:** Landscape has barely perceptible or no cultural elements that contribute to daytime light and glare. This may be typical of natural areas that have very limited human influence. **Project Corridor Environment:** Project transportation corridor is not present or are very narrow with little to no built elements or vertical surfaces that result in reflective glare. Vegetation along the corridor helps reduce glare. Regular traffic levels tend to be very low, such as along a single track rural or forest roadways.	**Natural Environment:** Densely vegetated and moderate to heavy shading or shadowing that may result from vegetation, landforms, or natural materials that create a canopy effect. Understories and ground planes may be dappled with sunlight in sunny conditions or understories can be seen as greyish, foggy, or muted in overcast and rainy conditions. Details may be slightly hard to see due to heavy shade and shadowing combined with low lighting levels and darker colored natural features. Smaller sized water bodies may be present. **Cultural Environment:** Landscape has very few cultural elements that contribute to daytime light and glare. This may be typical of natural areas or very low density forested or rural areas. **Project Corridor Environment:** Project transportation corridor is fairly narrow with few built elements and vertical surfaces that result in reflective glare. Vegetation along the corridor helps reduce glare. Regular traffic levels tend to be low, such as along a two-lane rural roadway.	**Natural Environment:** Moderate to dense vegetative cover with typically bright, sunny weather conditions so that vegetation's shade and shadowing helps filter sunlight, offsetting the effects of light and glare. Smaller to medium sized water bodies may be present. Or, little vegetation in a typically overcast, dull, or rainy environment where lack of sunshine offsets effects of little vegetative cover. Smaller to large sized water bodies may be present. **Cultural Environment:** Landscape has few cultural elements that contribute to daytime light and glare. This may be typical of areas with low density development, such as in rural areas. **Project Corridor Environment:** Project transportation corridor is narrow with some built elements and vertical surfaces that result in reflective glare. Vegetation along the corridor helps reduce glare. Traffic levels tend to range from low to moderately high depending on the time of day, such as along state routes and local suburban roadways.	**Natural Environment:** Moderate mix of vegetation and open spaces that provides a balance between light and glare in a range from dull to bright environments. Smaller to medium sized water bodies may be present. **Cultural Environment:** Landscape is moderately developed with cultural elements that contribute to daytime light and glare. This may be typical of areas with higher density rural development or lower to medium density suburban development. **Project Corridor Environment:** Project transportation corridor is slightly wide, where paved horizontal and vertical surfaces are common. Surface coloring contributes to glare. Vegetation along the corridor helps reduce glare. Traffic levels tend to range from moderate to high depending on the time of day, such as along local roadways that are developed or highways areas.	**Natural Environment:** More open mix of vegetation and open spaces that does not quite offset or balance the effects of light and glare in a range from dull to bright environments. Medium to larger sized water bodies may be present. **Cultural Environment:** Landscape is quite developed with suburban or urban development that contribute to daytime light and glare. This may be typical of highly suburbanized areas; lower density urban areas; or business, commercial, and industrial areas that have a higher ratio of impervious paving and build structures. **Project Corridor Environment:** Project transportation corridor is wide, where paved horizontal and vertical surfaces are prominent. Surface coloring contributes to glare. Vegetation along the corridor is sparse or absent. Regular traffic levels tend to be high, such as along highways and interstates traveling through highly populated areas.	**Natural Environment:** Little vegetative or landform cover with typically bright, sunny weather conditions and large bodies of water or lightly colored expanses of natural surfaces (e.g. snow cover, desert sands) other naturally reflective surfaces tend to be present. May be perceived as glaringly bright and cause visual discomfort. Details may be hard to see without protective eyewear. **Cultural Environment:** Landscape tends to be highly developed with urban uses with many reflective surfaces such as high rise buildings with many windows. **Project Corridor Environment:** Project transportation corridor is quite wide and consists of a great deal of paved horizontal and vertical surfaces. Surface coloring is neutral and helps to slightly reduce glare. Vegetation along the corridor is likely absent. Regular traffic levels tend to be high to very high, such as along highways and interstates traveling through urbanized areas.	**Natural Environment:** No vegetative or landform cover with typically bright, sunny weather conditions and large bodies of water or lightly colored expanses of natural surfaces (e.g. snow cover, desert sands) other naturally reflective surfaces tend to be present. May be perceived as glaringly bright and cause visual discomfort. Details may be hard to see without protective eyewear. **Cultural Environment:** Landscape tends to be very highly developed urban environments with a substantial amount of reflective surfaces such as many, glass-faced high rise buildings. In such instances, levels of daytime light and glare may be highly dependent on time of day (i.e., sun angle) and viewer position in the landscape (i.e., ground level views in a city may be shaded where views from different building levels are not). **Project Corridor Environment:** Project transportation corridor is very wide and paved horizontal and vertical surfaces are the most dominant features. Surface coloring is lighter and contributes to glare. Vegetation along the corridor is generally absent. Regular traffic levels tend to be very high, such as along interstates traveling through highly urbanized areas.
Light and Glare (L&G) Level Increase	Proposed Project Vicinity L&G Levels – Existing Project Vicinity L&G Levels = Change in L&G Levels[b]			AND	Proposed Project Site L&G Levels – Existing Project Site L&G Levels = Change in L&G Levels[b]		

Notes:

[a] Project site and project vicinity light and glare levels are evaluated using the same parameters.

[b] A positive number means an increase in L&G levels. A negative number means a decrease in L&G levels. Translate the numeric calculation to the descriptive Light and Glare Rating.

Table P-4. Nighttime Light and Glare Levels

Visual Resource	Very Low (1)	Low (2)	Moderately Low (3)	Moderate (4)	Moderately High (5)	High (6)	Very High (7)
Project Vicinity and Project Site	**Natural Environment:** High cloud cover or haze caused by natural conditions or atmospheric pollution. Tends to have extensive overhead cover present. Conditions allow for very low levels of nighttime lighting from the stars and moon. Colors and details cannot be seen at night. **Cultural Environment:** Landscape has barely perceptible or no cultural elements that contribute to nighttime light and glare because of very limited human influence. No traditional interior or exterior lighting, including Blue-Rich White Light (BRWL[a]) LED lighting, is present. Colors and details cannot be seen at night. **Project Corridor Environment:** No project transportation corridor lighting (typically overhead lighting). Colors and details cannot be seen without artificial lighting from vehicle headlights.	**Natural Environment:** Moderate cloud cover or haze caused by natural conditions or atmospheric pollution. Tends to have overhead cover present. Conditions allow for low levels of nighttime lighting from the stars and moon. Colors and details are very hard to see at night. **Cultural Environment:** Landscape has very few cultural elements that contribute to nighttime light and glare. This may be typical of natural areas or very low density forested or rural areas. Very low levels of interior and exterior lighting is present. BRWL LED lighting is not present. Colors and details are very hard to see at night. **Project Corridor Environment:** Very limited project transportation corridor lighting, such as individual light standards at major intersections. Colors and details cannot be seen along most of the corridor without artificial lighting from vehicle headlights.	**Natural Environment:** Slight cloud cover and haze, natural or otherwise, occurs on a regular basis. Moderate to little overhead cover. Conditions allow for some nighttime lighting from the stars and moon. Colors and details begin to become more visible at night. **Cultural Environment:** Very low levels of exterior lighting in developed areas or landscape has low density development, such as in rural areas, with limited amounts of interior and exterior nighttime lighting from buildings, vehicles, streets, etc. that provide low levels of lighting to the area and reflects off of the built environment to a small degree. BRWL LED lighting is likely not present. Colors and details begin to become more visible at night. **Project Corridor Environment:** Project transportation corridor lighting is more regular, yet still sparse. Colors and details are more regularly visible. Colors and details are more visible with artificial lighting from vehicle headlights.	**Natural Environment**: Cloud cover and haze, natural or otherwise, varies. Moderate to little overhead cover. Conditions allow for moderate levels of nighttime lighting from the stars and moon. Colors and details can be seen night to varying degrees of clarity based on level of detail and brightness of colors. **Cultural Environment:** Moderate amounts of interior and exterior nighttime lighting, such as in higher density rural development or lower to medium density development suburban areas, from buildings vehicles, streets, etc. that provide fairly well-lit conditions that reflects off of the built environment to a small degree. Traditional outdoor lighting may be intermixed independent sources of BRWL LED lighting that causes small patches of "daytime" lighting conditions at night. Visual discomfort in close proximity to pockets of highly lit areas. Colors and details can be seen night to varying degrees of clarity based on level of detail and brightness of colors. **Project Corridor Environment:** Project transportation corridor lighting is regular and illuminates much of the corridor at lower levels. Colors and details are enhanced with the addition of artificial lighting from vehicle headlights. BRWL LED lighting may be present at some locations.	**Natural Environment**: Cloud cover and haze, natural or otherwise, is rare. Sparse overhead cover. Conditions allow for nighttime lighting from the stars and moon. Colors and details are fairly visible at night. **Cultural Environment:** Substantial amount interior and exterior nighttime lighting, such as in suburban or urban development, from buildings, vehicles, streets, etc. to brighten the area and reflects off of the built environment. BRWL LED lighting begins to outweigh traditional outdoor lighting and causes small islands "daytime" lighting conditions at night. Nighttime lighting may cause visual discomfort across portions of the area. Lighting may lack proper shielding. Colors and details are fairly visible at night. **Project Corridor Environment:** Project transportation corridor lighting is regular, but brighter than traditional street lighting and illuminates much of the corridor. There may be lower lit portions of the corridor where artificial lighting from vehicle headlights are needed to better see colors and details. BRWL LED lighting is likely present.	**Natural Environment**: Typically, no cloud cover or haze caused by natural conditions or atmospheric pollution. Sparse overhead cover. Tends to have large water bodies or extensive snow cover present. Conditions allow for high levels of nighttime lighting from the stars and moon. Colors and details are easy to see at night. **Cultural Environment:** Landscape tends to be highly developed with urban uses with a substantial amount interior and exterior nighttime lighting from buildings, vehicles, streets, billboard, stadiums, etc. to illuminate the area and reflect off of the built environment. BRWL LED lighting is highly used and causes larger islands of "daytime" lighting conditions at night. Nighttime lighting causes visual discomfort across much of the area. Lighting may lack proper shielding. Colors and details are very easy to see at night. **Project Corridor Environment:** Project transportation corridor very well-lit, illuminating a great deal of the corridor. There may be lower lit portions of the corridor where artificial lighting from vehicle headlights are needed to better see colors and details. BRWL LED lighting is likely present.	**Natural Environment**: Typically, no cloud cover or haze caused by natural conditions or atmospheric pollution. No overhead cover. Tends to have large water bodies or extensive snow cover present. Conditions allow for high levels of nighttime lighting from the stars and moon. Colors and details are very easy to see at night. **Cultural Environment:** Landscape tends to be very highly developed urban environments with a great deal of interior and exterior nighttime lighting from buildings, vehicles, streets, billboard, stadiums, etc. to illuminate the area and reflect off of the built environment. BRWL LED lighting is prominent and causes expanses of "daytime" lighting conditions at night. Nighttime lighting causes visual discomfort across a large area. Lighting may lack proper shielding. Colors and details are very similar to daytime conditions. **Project Corridor Environment:** Project transportation corridor lighting is prominent and illuminates the majority of the corridor. Corridor lighting is so prominent that artificial lighting from vehicle headlights would not even be needed during nighttime driving conditions. BRWL LED lighting is likely prominent.
Light and Glare (L&G) Level Increase	Proposed Project Vicinity L&G Levels – Existing Project Vicinity L&G Levels = Change in L&G Levels[b]			AND	Proposed Project Site L&G Levels – Existing Project Site L&G Levels = Change in L&G Levels[b]		

Notes:

[a] For more information regarding BRWL effects, refer to International Dark-Sky Association 2010a, 2010b, and 2015.

[b] A positive number means an increase in L&G levels. A negative number means a decrease in L&G levels. Translate the numeric calculation to the descriptive L&G Rating.

Visual Resource Ratings—BLM-Administered Lands

For the rendering analysis on BLM-administered lands, a scenic quality evaluation was prepared in lieu of a visual quality evaluation to meet the assessment protocols for analyzing visual impacts on BLM-administered lands. The scenic quality evaluation was prepared using an adaptation of the BLM's VRM visual resource inventory method (BLM 1986) and BLM VRM Form 8400-5 *Scenic Quality Rating Summary* because it allows the various landscape elements that make up scenic quality to be quantified and rated, with the least amount of ambiguity or subjectivity. BLM's VRM visual resource inventory assigns lands an A, B, or C rating based on the apparent scenic quality, determined by using seven key factors (landscape features): landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. Three OEA reviewers evaluated these landscape features, rated them numerically on a comparative basis with similar features within the viewshed, and tabulated a total score of scenic quality (Table P-11).

The three reviewers scores were averaged to determine the score used in the analysis. Visual quality rating scores are as follows.

- 19 or more points: **A** rating indicates a high visual quality.
- 12 to 18 points: **B** rating indicates a moderate visual quality.
- 11 points or less: **C** rating indicates a low visual quality.

The landscape was evaluated for its existing and rendered conditions. A reduction in the existing conditions to a lower scenic quality rating constitutes an adverse effect. The scenic quality ratings for RKOPs on BLM-administered lands are also representative of changes that are likely to occur at other locations in the study area across the Action Alternatives. OEA used the scenic quality ratings assessment process to inform whether the proposed rail line would conform to the BLM VRM Class Objectives (Classes I, II, III, or IV). BLM's VRM Class Objectives, listed as follows, indicate how BLM-administered lands should be managed to protect visual resources.

- The Class I objective is to preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low.
- The Class II objective is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low.
- The Class III objective is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.
- The Class IV objective is to provide for management activities, which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.

Conceptual Rendering Rating Forms

OEA prepared rating forms showing the existing and proposed conditions for each conceptual rendering for both non-BLM-administered lands and BLM-administered lands.

Rating Forms for Non-BLM-Administered Lands

For the RKOPs on non-BLM-administered lands, including Ashley National Forest and other public lands, and scenic byways, OEA prepared a visual quality evaluation by following FHWA methods. These methods include establishing natural harmony, cultural order, and project corridor coherence ratings to determine the overall visual quality rating. As part of the rendering analysis, OEA also evaluated daytime and nighttime light and glare ratings. The rating forms for non-BLM-administered lands are provided below.

Table P-5. Summary of Visual Quality Ratings

Form 1: Conceptual Rendering Visual Quality Ratings

Substantially degrade the existing visual character or quality of the project site and its surroundings, including scenic vistas

RKOP	Existing	Existing Natural Harmony	Existing Cultural Order	Existing Project Corridor Coherence	Existing Visual Quality	VQ Rating	Rendered	Proposed Natural Harmony	Proposed Cultural Order	Proposed Project Corridor Coherence	Proposed Visual Quality	VQ Rating
RKOP 73		4	4	4.3	4.1	M		3	3.3	3.3	3.2	ML
RKOP 83		4.7	4.7	5.3	4.9	MH		4	4.3	4.7	4.3	M
RKOP 90		4.7	4	5.3	4.7	MH		4	3.7	3.7	3.8	M
RKOP 110-A		4.3	4	5.3	4.5	MH		3	3.3	3	3.1	ML
RKOP 110-B		4.3	4	5.3	4.5	MH		3.3	3.3	2.7	3.1	ML
RKOP 120		5	5	5.3	5.1	MH		2.7	3	2.7	2.8	ML
RKOP 125		5.7	5	5.7	5.5	H		1.3	1.7	1.3	1.4	VL
RKOP 126		5.7	5.3	5.7	5.6	H		3	3	3	3.0	ML
RKOP 139		5.3	5.7	5.7	5.6	H		4.3	4.3	4.3	4.3	M
RKOP 146		4	3.7	4.7	4.1	M		4	4	4.7	4.2	M
RKOP 156		6	5.3	6.3	5.9	H		5.3	4.3	5	4.9	MH

Table P-6. Existing and Rendered Natural Harmony Ratings

RKOP	Affected Action Alternative	View	OEA Visual Analyst 1	OEA Visual Analyst 2	OEA Visual Analyst 3	Averaged Total
RKOP 73	Wells Draw	Existing	4	4	4	4.0
		Rendered	3	3	3	3.0
RKOP 83	Indian Canyon, Whitmore Park	Existing	4	5	5	4.7
		Rendered	4	5	3	4.0
RKOP 90	Indian Canyon, Whitmore Park	Existing	5	4	5	4.7
		Rendered	3	3	4	3.3
RKOP 110-A		Existing	5	5	3	4.3

RKOP	Affected Action Alternative	View	OEA Visual Analyst 1	OEA Visual Analyst 2	OEA Visual Analyst 3	Averaged Total
	Indian Canyon, Wells Draw	Rendered	3	3	3	3.0
RKOP 110-B	Whitmore Park	Existing	5	5	3	4.3
		Rendered	3	4	3	3.3
RKOP 120	Whitmore Park	Existing	5	5	5	5.0
		Rendered	2	2	4	2.7
RKOP 125	Indian Canyon, Wells Draw	Existing	6	5	6	5.7
		Rendered	1	1	2	1.3
RKOP 126	Indian Canyon, Whitmore Park	Existing	5	6	6	5.7
		Rendered	3	3	3	3.0
RKOP 139	Indian Canyon, Whitmore Park	Existing	6	5	5	5.3
		Rendered	4	5	4	4.3
RKOP 146	Indian Canyon	Existing	4	4	4	4.0
		Rendered	4	4	4	4.0
RKOP 156	Whitmore Park	Existing	6	6	6	6.0
		Rendered	5	5	6	5.3

Table P-7. Existing and Rendered Cultural Order Ratings

RKOP	Affected Action Alternative	View	OEA Visual Analyst 1	OEA Visual Analyst 2	OEA Visual Analyst 3	Averaged Total
RKOP 73	Wells Draw	Existing	4	4	4	4.0
		Rendered	3	4	3	3.3
RKOP 83	Indian Canyon, Whitmore Park	Existing	5	5	4	4.7
		Rendered	5	5	3	4.3
RKOP 90	Indian Canyon, Whitmore Park	Existing	4	4	4	4.0
		Rendered	4	4	3	3.7
RKOP 110-A	Indian Canyon, Wells Draw	Existing	4	4	4	4.0
		Rendered	3	3	4	3.3
RKOP 110-B	Whitmore Park	Existing	4	4	4	4.0
		Rendered	3	3	4	3.3
RKOP 120	Whitmore Park	Existing	5	5	5	5.0
		Rendered	3	2	4	3.0
RKOP 125	Indian Canyon, Wells Draw	Existing	5	5	5	5.0
		Rendered	1	2	2	1.7
RKOP 126	Indian Canyon, Whitmore Park	Existing	6	5	5	5.3
		Rendered	2	3	4	3.0
RKOP 139	Indian Canyon, Whitmore Park	Existing	6	6	5	5.7
		Rendered	4	5	4	4.3
RKOP 146	Indian Canyon	Existing	4	3	4	3.7
		Rendered	4	4	4	4.0
RKOP 156	Whitmore Park	Existing	6	4	6	5.3
		Rendered	4	4	5	4.3

Table P-8. Existing and Rendered Project Corridor Coherence Ratings

RKOP	Action Alternative Affected	View	OEA Visual Analyst 1	OEA Visual Analyst 2	OEA Visual Analyst 3	Averaged Total
RKOP 73	Wells Draw	Existing	4	5	4	4.3
		Rendered	3	4	3	3.3
RKOP 83	Indian Canyon, Whitmore Park	Existing	5	6	5	5.3
		Rendered	4	6	4	4.7
RKOP 90	Indian Canyon, Whitmore Park	Existing	5	6	5	5.3
		Rendered	3	4	4	3.7
RKOP 110-A	Indian Canyon, Wells Draw	Existing	6	6	4	5.3
		Rendered	3	2	4	3.0
RKOP 110-B	Whitmore Park	Existing	6	6	4	5.3
		Rendered	3	2	3	2.7
RKOP 120	Whitmore Park	Existing	5	6	5	5.3
		Rendered	2	2	4	2.7
RKOP 125	Indian Canyon, Wells Draw	Existing	6	6	5	5.7
		Rendered	1	1	2	1.3
RKOP 126	Indian Canyon, Whitmore Park	Existing	6	6	5	5.7
		Rendered	2	4	3	3.0
RKOP 139	Indian Canyon, Whitmore Park	Existing	6	6	5	5.7
		Rendered	4	5	4	4.3
RKOP 146	Indian Canyon	Existing	4	5	5	4.7
		Rendered	4	5	5	4.7
RKOP 156	Whitmore Park	Existing	6	7	6	6.3
		Rendered	5	5	5	5.0

Table P-9. Summary of Daytime and Nighttime Light and Glare Ratings

Form 3a: Daytime – Light and Glare (L&G) Ratings

Create a new source of substantial light or glare that would adversely affect day or nighttime views in the study area

RKOP	Project Vicinity	Proposed Project Vicinity L&G Levels	Existing Project Vicinity L&G Levels	L&G Level Increase	Existing/ Proposed L&G Rating	Project Corridor	Proposed Project Site L&G Levels	Existing Project Site L&G Levels	L&G Level Increase	Existing/ Proposed L&G Rating
RKOP 73		4.4	4	0.4	M/M		4.4	4	0.4	M/M
RKOP 83		5.4	5	0.4	MH/MH		5.4	5	0.4	MH/MH
RKOP 90		5.4	5	0.4	MH/MH		5.4	5	0.4	MH/MH
RKOP 110-A		5.4	5	0.4	MH/MH		5.4	5	0.4	MH/MH
RKOP 110-B		5.4	5	0.4	MH/MH		5.4	5	0.4	MH/MH
RKOP 120		5.7	5	0.7	MH/MH		5.7	5	0.7	MH/MH
RKOP 125		5.5	3.3	2.2	MH/ML		5.5	3.3	2.2	MH/ML
RKOP 126		5.7	3.5	2.2	MH/ML		5.7	3.5	2.2	MH/ML
RKOP 139		5.3	5	0.3	MH/MH		5.3	5	0.3	MH/MH
RKOP 146		5.8	5.3	0.5	MH/MH		5.8	5.3	0.5	MH/MH
RKOP 156		4.8	4.8	0	M/M		4.8	4.8	0	M/M

Form 3b: Nighttime – Light and Glare (L&G) Ratings

RKOP	Project Vicinity	Proposed Project Vicinity L&G Levels	Existing Project Vicinity L&G Levels	L&G Level Increase	Existing/Proposed L&G Rating	Project Corridor	Proposed Project Site L&G Levels	Existing Project Site L&G Levels	L&G Level Increase	Existing/ Proposed L&G Rating
RKOP 73		5	5	0	MH/MH		5	5	0	MH/MH
RKOP 83		5	5	0	MH/MH		5	5	0	MH/MH
RKOP 90		5.1	5	0.1	MH/MH		5.1	5	0.1	MH/MH
RKOP 110-A		5	5	0	MH/MH		5	5	0	MH/MH
RKOP 110-B		5	5	0	MH/MH		5	5	0	MH/MH
RKOP 120		5.5	5.3	0.2	MH/MH		5.5	5.3	0.2	MH/MH
RKOP 125		5.7	5	0.7	MH/MH		5.7	5	0.7	MH/MH
RKOP 126		5.5	5	0.5	MH/MH		5.5	5	0.5	MH/MH
RKOP 139		5.5	5.5	0	MH/MH		5.5	5.5	0	MH/MH
RKOP 146		6	6	0	H/H		6	6	0	H/H
RKOP 156		5.7	5.7	0	MH/MH		5.7	5.7	0	MH/MH

Table P-10. Daytime—Project Vicinity Light and Glare Ratings

RKOP	Action Alternative Affected	View	OEA Visual Analyst 1	OEA Visual Analyst 2	OEA Visual Analyst 3	Averaged Total
RKOP 73	Wells Draw	Proposed	4.5	4.25	4.5	4.4
		Existing	4	4	4	4.0
RKOP 83	Indian Canyon, Whitmore Park	Proposed	5.5	5.25	5.5	5.4
		Existing	5	5	5	5.0
RKOP 90	Indian Canyon, Whitmore Park	Proposed	5	5.25	5.5	5.3
		Existing	5	5	5	5.0
RKOP 110-A	Indian Canyon, Wells Draw	Proposed	5.5	5.25	5.5	5.4
		Existing	5	5	5	5.0
RKOP 110-B	Whitmore Park	Proposed	5.5	5.25	5.5	5.4
		Existing	5	5	5	5.0
RKOP 120	Whitmore Park	Proposed	5.5	6	5.5	5.7
		Existing	5	5	5	5.0
RKOP 125	Indian Canyon, Wells Draw	Proposed	5.5	5	6	5.5
		Existing	3.5	3	3.5	3.3
RKOP 126	Indian Canyon, Whitmore Park	Proposed	6	5	6	5.7
		Existing	4	3	3.5	3.5
RKOP 139	Indian Canyon, Whitmore Park	Proposed	5.5	5	5.5	5.3
		Existing	5	5	5	5.0
RKOP 146	Indian Canyon	Proposed	6	5.25	6	5.8
		Existing	5.5	5	5.5	5.3
RKOP 156	Whitmore Park	Proposed	5.5	4	5	4.8
		Existing	5.5	4	5	4.8

Table P-11. Daytime—Project Corridor Light and Glare Ratings

RKOP	Action Alternative Affected	View	OEA Visual Analyst 1	OEA Visual Analyst 2	OEA Visual Analyst 3	Averaged Total
RKOP 73	Wells Draw	Proposed	4.5	4.25	4.5	4.4
		Existing	4	4	4	4.0
RKOP 83	Indian Canyon, Whitmore Park	Proposed	5.5	5.25	5.5	5.4
		Existing	5	5	5	5.0
RKOP 90	Indian Canyon, Whitmore Park	Proposed	5	5.25	5.5	5.3
		Existing	5	5	5	5.0
RKOP 110-A	Indian Canyon, Wells Draw	Proposed	5.5	5.25	5.5	5.4
		Existing	5	5	5	5.0
RKOP 110-B	Whitmore Park	Proposed	5.5	5.25	5.5	5.4
		Existing	5	5	5	5.0
RKOP 120	Whitmore Park	Proposed	5.5	6	5.5	5.7
		Existing	5	5	5	5.0

RKOP	Action Alternative Affected	View	OEA Visual Analyst 1	OEA Visual Analyst 2	OEA Visual Analyst 3	Averaged Total
RKOP 125	Indian Canyon, Wells Draw	Proposed	5.5	5	6	5.5
		Existing	3.5	3	3.5	3.3
RKOP 126	Indian Canyon, Whitmore Park	Proposed	6	5	6	5.7
		Existing	4	3	3.5	3.5
RKOP 139	Indian Canyon, Whitmore Park	Proposed	5.5	5	5.5	5.3
		Existing	5	5	5	5.0
RKOP 146	Indian Canyon	Proposed	6	5.25	6	5.8
		Existing	5.5	5	5.5	5.3
RKOP 156	Whitmore Park	Proposed	5.5	4	5	4.8
		Existing	5.5	4	5	4.8

Table P-12. Nighttime—Project Vicinity Light and Glare Ratings

RKOP	Action Alternative Affected	View	OEA Visual Analyst 1	OEA Visual Analyst 2	OEA Visual Analyst 3	Averaged Total
RKOP 73	Wells Draw	Proposed	5	5	5	5.0
		Existing	5	5	5	5.0
RKOP 83	Indian Canyon Whitmore Park	Proposed	5	5	5	5.0
		Existing	5	5	5	5.0
RKOP 90	Indian Canyon Whitmore Park	Proposed	5	5.25	5	5.1
		Existing	5	5	5	5.0
RKOP 110-A	Indian Canyon Wells Draw	Proposed	5	5	5	5.0
		Existing	5	5	5	5.0
RKOP 110-B	Whitmore Park	Proposed	5	5	5	5.0
		Existing	5	5	5	5.0
RKOP 120	Whitmore Park	Proposed	5	5.5	6	5.5
		Existing	5	5	6	5.3
RKOP 125	Indian Canyon Wells Draw	Proposed	6	6	5	5.7
		Existing	5	5	5	5.0
RKOP 126	Indian Canyon Whitmore Park	Proposed	5.5	5.5	5.5	5.5
		Existing	5	5	5	5.0
RKOP 139	Indian Canyon Whitmore Park	Proposed	5.5	5	6	5.5
		Existing	5.5	5	6	5.5
RKOP 146	Indian Canyon	Proposed	6	6	6	6.0
		Existing	6	6	6	6.0
RKOP 156	Whitmore Park	Proposed	6	5	6	5.7
		Existing	6	5	6	5.7

Table P-13. Nighttime–Project Corridor Light and Glare Ratings

RKOP	Action Alternative Affected	View	OEA Visual Analyst 1	OEA Visual Analyst 2	OEA Visual Analyst 3	Averaged Total
RKOP 73	Wells Draw	Proposed	5	5	5	5.0
		Existing	5	5	5	5.0
RKOP 83	Indian Canyon Whitmore Park	Proposed	5	5	5	5.0
		Existing	5	5	5	5.0
RKOP 90	Indian Canyon Whitmore Park	Proposed	5	5.25	5	5.1
		Existing	5	5	5	5.0
RKOP 110-A	Indian Canyon Wells Draw	Proposed	5	5	5	5.0
		Existing	5	5	5	5.0
RKOP 110-B	Whitmore Park	Proposed	5	5	5	5.0
		Existing	5	5	5	5.0
RKOP 120	Whitmore Park	Proposed	5	5.5	6	5.5
		Existing	5	5	6	5.3
RKOP 125	Indian Canyon Wells Draw	Proposed	6	6	5	5.7
		Existing	5	5	5	5.0
RKOP 126	Indian Canyon Whitmore Park	Proposed	5.5	5.5	5.5	5.5
		Existing	5	5	5	5.0
RKOP 139	Indian Canyon Whitmore Park	Proposed	5.5	5	6	5.5
		Existing	5.5	5	6	5.5
RKOP 146	Indian Canyon	Proposed	6	6	6	6.0
		Existing	6	6	6	6.0
RKOP 156	Whitmore Park	Proposed	6	5	6	5.7
		Existing	6	5	6	5.7

Rating Forms for BLM-Administered Lands

For the RKOPs on BLM-administered lands, the OEA reviewers prepared visual quality evaluation ratings using an adaptation of the BLM's VRM visual resource inventory method (BLM 1986) and BLM VRM Form 8400-5 *Scenic Quality Rating Summary,* as stated above. Table P-14 summarizes the guidance for BLM VRM Form 8400-5. For each key factor evaluated, a numerical rating is determined, based on existing and proposed visual conditions. The sum of those numerical ratings for each OEA reviewer are provided in Table P-15, which summarizes the ratings for the RKOPs located on BLM-administered lands.

Table P-14. Scenic Quality Inventory and Evaluation Guidance

Key Factors	Scenic Quality Inventory and Evaluation Chart Rating Criteria and Scores		
Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers.	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features that are interesting though not dominant or exceptional.	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features.
	5	3	1
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns.	Some variety of vegetation, but only one or two major types.	Little or no variety or contrast in vegetation.
	5	3	1
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape.	Flowing, or still, but not dominant in the landscape.	Absent, or present, but not noticeable.
	5	3	0
Color	Rich color combinations, variety, or vivid color; or pleasing contrasts in the soil, rock, vegetation, water, or snowfields.	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element.	Subtle color variations, contrast, or interest; generally mute tones.
Influence of Adjacent Scenery	Adjacent scenery greatly enhances visual quality.	Adjacent scenery moderately enhances overall visual quality.	Adjacent scenery has little or no influence on overall visual quality.
Scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc.	Distinctive, though somewhat similar to others within the region.	Interesting within its setting, but fairly common within the region.
	* 5+	3	1
Cultural Modifications	Modifications add favorably to visual variety while promoting visual harmony.	Modifications add little or no visual variety to the area, and introduce no discordant elements.	Modifications add variety but are very discordant and promote strong disharmony.
	2	0	-4

Table P-15. Scenic Quality Rating Summary for Renderings on BLM-Administered Lands

RKOP	Action Alternative Affected	View	OEA Visual Analyst 1	OEA Visual Analyst 2	OEA Visual Analyst 3	Averaged Total	Final Rating[a]
RKOP 27	Wells Draw	Existing	9	8	6	7.7	C
		Rendered	9	7	6	7.3	C
RKOP 33	Wells Draw	Existing	8	10	10.5	9.5	C
		Rendered	5	4	8.5	5.8	C
RKOP 37	Wells Draw	Existing	11	10	11	10.7	C
		Rendered	3	2	6.5	3.8	C
RKOP 44	Wells Draw	Existing	11	10	12	11	C
		Rendered	9	10	9	9.3	C

Notes:

[a] Scenic quality ratings: A = 19 or more; B = 12-18; C = 11 or less

References

Bureau of Land Management (BLM). 1986. Visual Resource Management Manual H-8410-1: Visual Resource Inventory. January 1986. Available: https://blmwyomingvisual.anl.gov/docs/BLM_VRI_H-8410.pdf. Accessed: June 2020.

Federal Highway Administration (FHWA). 2015. *Guidelines for the Visual Impact Assessment of Highway Projects*. (FHWA-HEP-15-029.) USDOT (US Department of Transportation). Washington, DC. January 2015.

International Dark-Sky Association. 2010a. Seeing Blue. April 2010. *Nightscape 80*: 8-12. Available: http://darksky.org/wp-content/uploads/bsk-pdf-manager/29_SEEINGBLUE(1).PDF. Accessed: November 7, 2019.

International Dark-Sky Association. 2010b. *Visibility, Environmental, and Astronomical Issues Associated with Blue-Rich White Outdoor Lighting*. May 4, 2010. Available: http://www.darksky.org/wp-content/uploads/bsk-pdf-manager/8_IDA-BLUE-RICH-LIGHT-WHITE-PAPER.PDF. Accessed: November 7, 2019.

International Dark-Sky Association. 2015. IDA Issues New Standards on Blue Light at Night. April 2015. *Nightscape, The 2014 Annual Report. 94*: 10. Available: http://darksky.org/wp-content/uploads/2015/06/NS94.pdf. Accessed: November 7, 2019.

Litton, R. Burton, Jr. 1968. *Forest Landscape Description and Inventories – A Basis for Land Planning and Design*. (U.S. Department of Agriculture Forest Service Research Paper PSW-49) Pacific Southwest Forest and Range Experiment Station. Berkeley, CA. 1968.

Attachment I

Photographs of Existing Conditions from 21 Candidate Key Observation Points

KOP Number	Alternative	Description	Photograph
1	Indian Canyon, Wells Draw, Whitmore Park	This depicts the view of the project terminus for all three alternatives from Leland Bench Road, a public roadway. This rendering would also illustrate the rail line crossing flatter land.	

KOP Number	Alternative	Description	Photograph
15 or 79	Indian Canyon and Whitmore Park	KOP 15 depicts the view of two alternatives from Avenue 3540 W, a public roadway that travels through agricultural lands. This rendering would also illustrate an at-grade road crossing and the rail line crossing flatter land. KOP 79 depicts the view of two alternatives from Sowers Canyon Road, a public roadway. This rendering would also illustrate an grade-separated road crossing, impacts to agricultural lands, and the rail line crossing flatter land.	

KOP Number	Alternative	Description	Photograph
			

KOP Number	Alternative	Description	Photograph
146	Indian Canyon	This depicts the view from a residential area located off of US 40. This rendering would show how the foreground views would be altered for residents in the area south of Coulton Road. It also illustrates the rail line crossing flatter land between the two areas of development. KOP 146 could show a wider view angle with rail line paralleling Coulton Road and the road crossing for George Marett Drive	

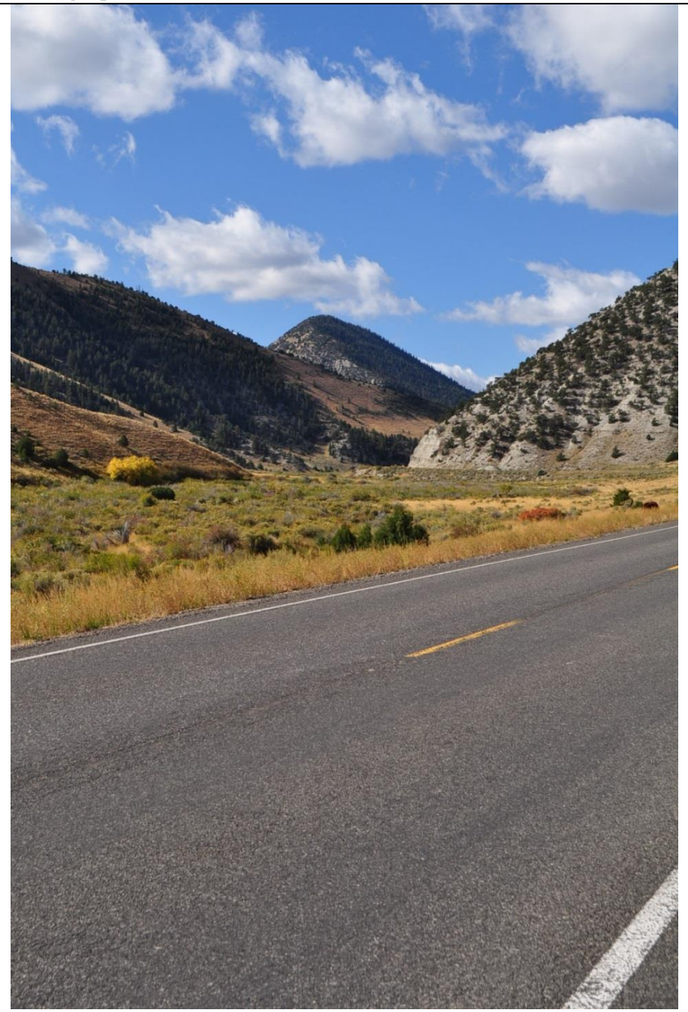
KOP Number	Alternative	Description	Photograph
150	Indian Canyon	This depicts the view from a residential area located off of US 40. This rendering would show how the foreground views would be altered for residents in the area from an elevated vantage north of Coulton Road. It also illustrates the rail line crossing flatter land between the two areas of development.	

KOP Number	Alternative	Description	Photograph
156	Whitmore Park	This depicts the view from a residential area located off of US 40. KOP 156 would provide an elevated vantage point that would show how the foreground of this scenic vista view would be altered for residents in the area. The rendering would also illustrate the rail line crossing flatter land.	

KOP Number	Alternative	Description	Photograph
120	Whitmore Park	This depicts the view from an area with scattered rangelands, located off of US 191. This rendering would show how the foreground of this scenic vista view would be altered by the rail line crossing the roadway and switching back and forth up the hillsides.	

KOP Number	Alternative	Description	Photograph
83	Indian Canyon & Whitmore Park	This depicts the view from Road 11160 South, off of Dinosaur Diamond Prehistoric Highway/ Indian Canyon Scenic Byway (US 191). This rendering would show how foreground views toward Tribal Trust Lands would be altered. It also illustrates the rail line crossing the base of hillsides. It also shows areas of cut and fill that occur as the rail line traverses the landscape.	

KOP Number	Alternative	Description	Photograph
139	Indian Canyon & Whitmore Park	This depicts the view from US 191. This rendering would provide roadside vantage point that would show how the foreground of this scenic view would be altered by the rail line traveling along the base of the hills. It also illustrates how the rail line would affect this rural residence/ranch and shows areas of cut and fill that occur as the rail line traverses the landscape.	

KOP Number	Alternative	Description	Photograph
90	Indian Canyon & Whitmore Park	This depicts the view from US 191 within the Ashley National Forest. This rendering would provide roadside vantage point that would show how the foreground of this scenic view would be altered by the rail line traveling along the base of the hills. It also illustrates how the rail line would cut through the base of a hill and a bridge crossing over a drainage.	

KOP Number	Alternative	Description	Photograph
126	Indian Canyon & Whitmore Park	This depicts the view from US 191. KOP 126 would provide roadside vantage point from within the Ashley National Forest that would show how the foreground of this view would be altered by the rail line tunneling through and exiting from/entering the hill. It would also show an at-grade road crossing and road realignment.	

KOP Number	Alternative	Description	Photograph
125	Indian Canyon & Wells Draw	This depicts the view from US 191. This rendering would provide roadside vantage point from within the Ashley National Forest that would show how the foreground of this view would be altered by the rail line switching back and forth across the hillside. It would also show an at-grade road crossing and road realignment.	

KOP Number	Alternative	Description	Photograph
27	Wells Draw	This depicts the view from an interpretive overlook located just east of Nine Mile Canyon Scenic Backway. This rendering would provide an elevated vantage point that would show how middleground views from the interpretive overlook and Nine Mile Canyon Scenic Backway would be altered. This is BLM VRM Class III lands.	

KOP Number	Alternative	Description	Photograph
33	Wells Draw	This depicts the view from Nine Mile Canyon Scenic Backway. This rendering would provide a vantage point that would show how foreground views from Nine Mile Canyon Scenic Backway would be altered. It also shows where a bridge would be built and areas of cut and fill that occur as the rail line traverses the top of the ridgeline. This is BLM VRM Class III lands.	

KOP Number	Alternative	Description	Photograph
37	Wells Draw	This depicts views from Nine Mile Canyon Scenic Backway, which is well-traveled, and illustrates how foreground views of the rail line crossing the roadway would likely appear. This view encompasses a wide viewshed, which occur elsewhere in the study area. It also shows where a grade-separated crossing would be built to cross the road and areas of mostly cut that occur as the rail line traverses the landscape. This is BLM VRM Class III lands.	

KOP Number	Alternative	Description	Photograph
44	Wells Draw	KOP 44 depicts the view from an overlook area located just east of Nine Mile Canyon Scenic Backway. This rendering would provide an elevated vantage point that would show how the foreground of this scenic vista view would be altered. It also illustrates the rail line crossing flatter land. It also shows areas of cut and fill that occur as the rail line traverses the landscape. This is BLM VRM Class III lands.	

KOP Number	Alternative	Description	Photograph
49 or 50	Wells Draw	This depicts views from unpaved portions of Nine Mile Canyon Scenic Backway and illustrates how foreground views of the rail line crossing the roadway would likely appear. It also shows where a bridge would be built to cross the road and areas of mostly cut that occur as the rail line traverses the landscape. The view from KOP 49 would show one bridge crossing (over the road) and the view from KOP 50 would show two bridge crossings (over the road and across the nearby hillsides). This is BLM VRM Class III lands.	

KOP Number	Alternative	Description	Photograph

KOP Number	Alternative	Description	Photograph
73	Wells Draw	KOP 73 (middle picture) would show a lot of cut and fill, and associated vegetation removal, from where the rail line runs parallel to Argyle Canyon Road. Residents would be removed to accommodate rail line.	

KOP Number	Alternative	Description	Photograph
114	Indian Canyon, Wells Draw, Whitmore Park	This is where the Indian Canyon and Wells Draw Alternatives diverge from the Whitmore Park Alternative. There would be two different renderings for this KOP that would depicts the view from Emma Park Road for the Indian Canyon and Wells Draw Alternatives and then for the Whitmore Park Alternative. This rendering location was chosen to illustrate how the rail line would traverse a large portion of the view.	

KOP Number	Alternative	Description	Photograph
110	Indian Canyon, Wells Draw, Whitmore Park	This depicts a view from the intersection of Emma Park Road with US 6, at the terminus for the rail line. This would illustrate how the rail line ties in to the existing rail line, a bridge across the existing rail line, and areas of cut and fill. Two renderings may be needed to show the Indian Canyon and Wells Draw Alternatives and the Whitmore Park Alternative, because the Whitmore Park Alternative crosses the existing rail line approximately 625 feet southeast of the crossing for the Indian Canyon and Wells Draw Alternatives and the alignments differ slightly.